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Impact of Nutrition Counselling on Food and Nutrient Intake and Haematological Profile of Rural Pregnant Women

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The unfortunate state of nutrition in countries like India is attributed to several factors. Poverty and low purchasing power are no doubt major factors contributing to malnutrition, lack of aware-ness and paucity of information also aggravate the problem. There are three population groups who suffer from the ill effects of malnutrition. These vulnerable segments are pre-school children, expectant and nursing mothers. An expectant and nursing mother needs to be provi-ded adequate nutritional intake for maternal and foetal tissue growth and her own usual mainte-nance requirements. An acute or chronic depri-vation of dietary intake may result in poor preg-nancy outcome. In India almost one third of babies born are low birth weight mainly attributable to poor maternal health and nutrition during preg-nancy (Sachdev and Choudhury, 1994).

Nutrition counselling is one of the prere-quisites for improving the nutritional status of any group. The prenatal patient represents an ideal opportunity for nutrition counselling, since at that time more than any other time, she may be highly motivated to understand and accept advice. Hence the present study was conducted to see the impact of nutrition counselling on food and nutrient intake and haematological profile of pregnant women.

MATERIALS AND METHODS

The study was conducted on 60 rural pregnant women (18-33 years) belonging to low socio-economic status in three villages of Ludhiana district. The subjects were equally divided into two groups-Experimental (E) and Control (C) group. In the experimental group women were imparted nutrition counselling for a period of five months, starting from fifth month till ninth month (end term). Nutrition counselling was imparted once a month by individual contact during 5^{th}, 7^{th} and 9^{th} month of pregnancy. During 6^{th} and 8^{th} month of pregnancy nutrition counselling was imparted twice a month by group contacts. The subjects were assembled at *dharamshalla* and were made to sit comfortably. Nutrition counselling was imparted about the functions of food, balanced diet, nutritional requirements during pregnancy, improving nutritive value of foods. The teaching was carried out in vernacular through lectures, discussion and demonstrations. Visual aids like charts, posters and pamphlets were also used. Nutritional status of pregnant women was assessed during 5^{th} and 9^{th} month of pregnancy using four methods i.e. dietary survey, anthropometric measurements, clinical examination and biochemical investigation of blood. Information regarding dietary intake of subjects was collected by 24 hour recall method for three consecutive days using standardised containers. The nutrient content of diets consumed by subjects were calculated using 'MSU Nutriguide' software (Song et al., 1992). A series of haematological investigations like haemoglobin (Hb), Packed Cell Volume (PCV) and Mean Corpuscular Haemoglobin (MCH) were carried out during 5^{th} and 9^{th} month of pregnancy using standard methods. Data was analysed statistically. Comparison of food and nutrient intake of E and C group was made by assessing the significance of the difference between their respective means by applying student 't' test (Gupta and Saini, 1988).

RESULTS AND DISCUSSION

During 5^{th} month of pregnancy, there was no statistically significant difference in the food and nutrient intake of subjects in E and C groups.

Food Intake

The mean daily intake of different foods is presented in Table1. The intake of cereals in E and C group was 270 and 271 g during fifth month and 331 and 296 g during ninth month, respectively. As compared to suggested intakes by ICMR (1981) intake of cereals and pulses was inadequate in both the groups during 5^{th} and 9^{th} month of pregnancy. Intake of cereals and pulses in E group, during ninth month was significantly ($P<0.01$) higher as compared to C group. The mean daily intake of pulses in group E and C was 28, 27 g during 5^{th} month and 35, 29 g during 9^{th}

Table 1: Average daily food intake of the subjects.

Food groups (g)	*Fifth month*		*Ninth month*		*RDA**	*t-value (E & C group)*
	Experimental (n=30)	*Control (n=30)*	*Experimental (n=30)*	*Control (n=30)*		
Cereals	270 ± 9.7	271 ± 1.15	331 ±15.9	296 ± 3.07	475	6.55**
Pulses	28 ± 0.31	27 ± 0.81	35 ± 2.82	29 ± 1.18	60	2.80**
Green leafy vegetables	89 ± 0.78	87 ± 0.81	126 ± 3.2	107 ± 1.19	100	7.68**
Other vegetables	72 ± 0.70	71 ± 0.50	88 ± 3.2	73 ± 1.2	40	7.18**
Roots and Tubers	49 ± 0.67	48 ± 0.57	87 ± 0.71	65 ± 0.69	50	3.21**
Milk & milk products	308 ± 1.37	312 ± 1.06	392 ± 5.6	338 ± 3.5	250	4.80**
Fats and oils	18 ± 0.58	16 ± 1.13	20 ± 0.50	20 ± 0.50	30	0.70NS
Sugar and jaggery	29 ± 0.63	30 ± 0.54	32 ± 0.43	33 ± 0.81	30	1.67NS

Values are Mean±SEM

**Significant at (p<0.01) level NS Non Significant * ICMR (1981)

month.

Sachdeva and Mann (1995) and Sachdeva et al. (1996) also reported inadequate intake of cereals and pulses among rural pregnant women in Punjab. Consumption of green leafy vegetables (GLV) in group E and C during 5th and 9th month was 89, 87g and 126, 107g, respectively. In E group intake of GLV was significantly (P<0.01) more than that of C group. It may be due to nutrition counselling imparted to women during the study. At ninth month the intake of GLV was more as compared to suggested intakes which may be due to more availability of GLV in winter season. Intake of other vegetables and roots and tubers was almost double than the suggested intakes. During ninth month the intake of other vegetables was 88 and 73g and roots and tubers was 87 and 65g in E and C group, respectively which were significantly (P<0.01) higher in E group as compared to C group.

The consumption of milk and milk products was above the RDI in both the groups during 5th and 9th month. After imparting nutrition counselling the consumption of milk and milk products in E group was significantly (P<0.01) higher than that of C group (392 vs 338g). Sachdeva et al (1996) Chawla and Puri (1996) also have reported similar findings. Mean daily intake of fats and oils was inadequate in both the groups, may be due to poor purchasing power of subjects. However, intake of sugar and jaggery was slightly more than suggested intakes in both the groups.

Nutrient Intake

Table 2 indicates that the average daily intake of energy in E and C group was 1856, 1760 Kcal during 5th month and 2103, 1882 Kcal during 9th month, which was less than the RDA (ICMR, 1987). After nutrition counselling improvement in energy intake was significantly (P<0.01) higher in E group as compared to C group (247 vs 122 Kcal). As compared to RDA (ICMR, 1987) protein intake was 88 percent during 5th month in both the groups. However, at the end of gestation, intake was 98 and 91 percent in E and C groups, respectively. Intake of invisible fat in E and C group was 33 and 31g during 5th month and 36 and 35 g during 9 month of pregnancy. The daily intake of calcium during 5th and 9th month in E and C group was 1210, 1192mg and 1472, 1237mg, respectively. Intake was more than the RDA, which was attributed to more intake and easy availability of green leafy vegetables and milk and milk products. Group E had significantly (P<0.01) higher intake as compared to C group at 9th month. Similar to present findings, Hira et al (1986) have reported adequate intake of calcium by Punjabi pregnant women. Intake of iron in E group was significantly (P<0.01) more than C group during 9th month, but it did not meet the recommendations of 38mg. Similarly Rawtani and Verma (1989) reported adequate intake of iron among the pregnant women of Jodhpur.

Increase in retinol intake of E group was significantly (P<0.01) higher as compared to C group (245 vs 55mg) which could be due to the higher intake of milk and milk products, leafy vegetables and fruits rich in vitamin A. The mean daily intake of thiamine in E and C groups was more than the RDA (154 and 138 percent). During ninth month of pregnancy, the intake of riboflavin and niacin in E group was more than the RDA

Table 2: Average daily nutrient intake of the subjects

Nutrients	*Fifth month*		*Ninth month*		*RDA**	*t-value*
	Experimental (n=30)	*Control (n=30)*	*Experimental (n=30)*	*Control (n=30)*		*(E&C group)*
Energy (kcal)	1856 ± 44.8	1760 ± 45.8	2103 ± 33.4	1882 ± 23.7	2525	3.75**
Protein (g)	58 ± 1.90	57 ± 1.64	64 ± 1.20	59 ± 1.85	65	3.80**
Total fat (g)	51 ± 1.61	47 ± 1.54	56 ± 1.75	55 ± 1.73	55 [a]	1.42NS
Invisible fat (g)	33 ± 0.72	31 ± 0.63	36 ± 0.78	35 ± 0.73	30	1.33NS
Calcium (mg)	1210 ± 42.1	1192 ± 38.5	1472 ± 42.7	1237 ± 33.0	1000	6.24**
Iron (mg)	29 ± 0.70	28 ± 0.87	36 ± 3.08	33 ± 1.40	38	3.50**
Retinol equivalents (ug)	819 ± 45.0	866 ± 34.8	1064 ± 36.9	921 ± 24.5	600	4.65**
Thiamine (mg)	1.7 ± 0.50	1.70 ± 0.05	2.0 ± 0.13	1.8 ± 0.04	1.3	2.75**
Riboflavin (mg)	1.2 ± 0.70	1.3 ± 0.08	1.6 ± 0.60	1.4 ± 0.09	1.5	2.86**
Niacin (mg)	13.9 ± 0.50	13.8 ± 0.30	16.6 ± 0.80	14.5 ± 0.69	16	2.87**
Folic acid (ug)	201 ± 9.50	186 ± 14.4	292 ± 11.7	179 ± 7.40	400	4.80**
Ascorbic acid (mg)	64 ± 5.20	66 ± 3.83	99 ± 10.7	86 ± 6.2	40	3.16**

Values are Mean±SEM **Significant at 1% ($p<0.01$) level NS Non Significant *ICMR (1989)
[a] Calculated (10-30% of calories)

whereas it was less than RDA in C group. The average daily intake of folic acid in E and C groups was 201, 186 and 292, 179mg during 5th and 9th month, respectively. Although intake of folic acid in E group was significantly ($P<0.01$) more as compared to C group but it did not meet the recommendations i.e. 400mg. Sachdeva and Mann (1995) and Chawla and Puri (1996) also reported inadequate intake of folic acid among pregnant women in Punjab.

The mean daily intake of ascorbic acid was more than the RDA in both the groups during 5th and 9th month. The increase observed in E group was significantly ($P<0.01$) more than in C group (35 vs 20mg) which clearly indicated that nutrition education imparted to pregnant women helped them in better selection of foods rich in vitamin C like lemons, tomatoes, green leafy vegetables and sprouted pulses.

Clinical Manifestations of Nutrient Deficiency

The data regarding clinical symptoms of nutrient deficiencies (Table 3) revealed extensive prevalence of anaemia during 5th month i.e. 86.7 and 80 percent in E and C group, respectively. The most common clinical symptoms of iron inadequacy i.e. pale conjuctiva and pale skin were more evident during 9th month in C group (83.3 and 86.6%) as compared to E group (10 and 26.6 %).

At 5th month feeling of fatigue was complained by 43.3 percent subjects in each group, at 9th month it reduced to 6.7 percent in E group and increased to 60 percent in C group. Symptoms of anaemia and other nutritional deficiencies decreased during 9th month in E group which could be due to impact of nutrition counselling.

Biochemical Assessment

Haematological profile of subjects (Table 4) indicated that Hb level was 9.7 and 9.0g/ dl in E and C group, respectively. During 9th month Hb level increased in E group (11.4g/dl) and decreased in C group (9.2g/dl). The mean PCV value was 28.9, 28.1 and 33.3, 29.1 percent during 5th and 9th month in E and C group, respectively. MCHC values during 5th month were 33.56 and 33.2 percent in E and C group whereas corresponding values during 9th month were 34.23, 33.94 percent which were within normal range. After nutrition counselling Hb and PCV values were significantly ($P<0.01$) higher in E group as compared to C group.

Although nutrition counselling resulted in better food intake and regular use of ferrous sulphate tablets by the subjects in E group, yet 50 percent subjects had Hb level <11g/dl. However in control group only 16.6 percent subjects had Hb level >11g/dl. Lower Hb values in the present study coincides with the findings reported by Sachdeva et al. (1996).

The present investigation showed an improvement in food and nutrient intake among the subjects at the end of gestation due to increased requirements of pregnancy. Improvement was found to be significantly higher in E group as compared to C group for most of the nutrients but intake was below the recom-

Table 3: Nutritional deficiency symptoms during pregnancy

Symptoms	*Fifth month*				*Ninth month*			
	Experimental (n=30)		*Control (n=30)*		*Experimental (n=30)*		*Control (n=30)*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*
a) Anaemia								
i) Pale conjuctiva	12	40.0	14	46.7	3	10.0	25	83.3
ii) Pale skin	26	86.7	24	80.0	8	26.6	26	86.6
iii) Flat nails								
Fingers	4	13.3	3	10.0	3	10.0	3	10.0
Toes	4	13.3	3	10.0	3	10.0	0	0
iv) Koilonychia								
Fingers	3	10.0	3	10.0	0	0	1	3.3
Toes	5	16.6	4	13.3	1	3.3	0	0
b) Angular stomatitis	4	13.3	5	16.6	3	10.0	4	13.3
c) Cheilosis	4	13.3	9	30.0	3	10.0	6	20.0
d) Bleeding gums	3	10.0	8	26.7	2	6.7	7	23.3
e) Incidence of headache	7	23.3	9	30.0	5	16.6	6	20.0
f) Feeling of fatigue	13	43.3	13	43.3	2	6.7	18	60.0
g) Feeling of lethargy	11	36.7	14	46.6	8	26.7	10	33.3

Table 4: Hematological profile of pregnant women

Blood Parameters	*Fifth month*		*Ninth month*		*Normal value*	*t-value (E & C gp)*
	Experimental (n=30)	*Control (n=30)*	*Experimental (n=30)*	*Control (n=30)*		
Haemoglobin (g/dl)	9.7 ± 0.16	9.0 ± 0.07	11.4 ± 0.17	9.2 ± 0.27	11.0	2.68**
Haematocrit (PCV)%	28.9 ± 0.75	28.1 ± 0.28	33.3 ± 0.42	27.1 ± 0.27	32.36	3.74**
Mean carpuscular Haemoglobin Concentration (%)	33.56 ± 0.63	33.02 ± 0.30	34.23 ± 0.58	33.94 ± 0.60	30.35	2.17**

Values are Mean ± SEM ** Significant at 1% ($p<0.01$) level * Significant at 5% ($p<0.05$) level

mendations for some nutrients despite imparting nutrition education.

Inadequate nutrient intake might be due to poverty, low purchasing power, lack of knowledge, ignorance, illiteracy and less availa-bility of foods. Inadequate nutrient intake showed the wide prevalence of iron deficiency anaemia among the subjects. The study shows that in low socio-economic group, nutrition education is likely to result in better nutrient intake and haematological profile. However, there is need to impart concerted nutrition education to pregnant women for a longer duration starting earlier in pregnancy to improve their nutritional status to the desired level.

KEYWORDS Nutrition Counselling. Pregnant Women. Food Consumption. Nutrient Intake

ABSTRACT Sixty pregnant women belonging to low socio-economic status during 5th month of pregnancy were selected from three villages of Ludhiana district. They were assessed for their nutritional status and divided into two groups. Group I (30 women) was given nutrition education for five months about nutritional needs during pregnancy, served as Experimental (E) group and other 30 women served as control (C) group. Dietary survey revealed that the intake of cereals, pulses, green leafy vegetables and fats and oils was less than Recommended Dietary Intakes (ICMR 1980). However, the intake of milk and milk products, other vegetables, roots and tubers and sugar and jaggery was more than the recommended intakes. Average energy intake was 1856, 1760 Kcal and 2103, 1882 Kcal during 5th and 9th month by the subjects belonging to E and C group, which was less than the RDA. However, intake of protein was almost adequate. Nutrient intake during 9th month improved in both the groups due to increased requirements of pregnancy. In E group intake of all the nutrients was significantly higher as compared to C group. This may be due to more consumption of pulses, milk and milk products and leafy vegetables and also due to adoption of desirable nutritional practices like use of sprouted grains and other nutritious foods. Thus there is wide scope of imparting nutrition counselling to pregnant women to improve their nutritional status and that of newborns.

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